CALIFORNIA DIVISION OF MINES AND GEOLOGY

FAULT EVALUATION REPORT FER-97

April 3, 1980

1. Name of fault.
   Pinole fault and related faults.

2. Location of fault.
   South-central part of the Mare Island 7.5-minute quadrangle and north-central part of the Richmond 7.5-minute quadrangle, Contra Costa County (figure 1).

3. Reason for evaluation.
   Part of 10-year program to evaluate and revise Alquist-Priolo Special Studies Zones (SSZ) around existing active faults.

4. List of references.

Bishop, C.C., and Knox, R.D., 1973, Geological and geophysical investigations for Tri-Cities seismic safety and environmental resources study: California Division of Mines and Geology, Preliminary Report 19, map scale 1:24,000.

Burkland and Associates, 1973, Fault investigation, East Bluff IV, Pinole, California: Consulting report prepared for ENGEO, INC., Berkeley, October 9, 10 p.

Cooper-Clark & Associates, 1971, Geologic and preliminary soil investigation, proposed land development, Hercules, California: Consulting report, May 21, 14 p., map scale 1" = 500!

Cooper-Clark & Associates, 1974, Letter report from F.A. Stejer to J.E. Slosson re: Special Studies Zones Maps of the Richmond and Mare Island quadrangles, April 10, 6 p.

ENGEO Incorporated, 1978, Kinyon Property, Pinole, California, geotechnical investigation: Consulting report for the City of Pinole, April 10, 7 p.

Hart, E.W., 1977, Fault hazard zones in California; California Division of Mines and Geology, Special Publication 42, 24 p.

Sheehan, J.R., 1956, The structure and stratigraphy of northwestern Contra Costa County, California: Unpublished MS thesis, University of California, Berkeley, map scale 1:24,000.

Sims, J.D., Fox, K.F., Jr., Bartow, J.A., and Helley, E.J., 1973, Preliminary geologic map of Solano County and parts of Napa, Contra Costa, Marin, and Yolo Counties, California: U.S. Geological Survey, Miscellaneous Field Studies, Map MF-484, scale 1:62,500.

Weaver, C.E., 1949, Geologic Map of the Mare Island quadrangle: in Weaver, C.E., Geology and Mineral Deposit of an area north of San Francisco Bay, California Division of Mines, Bulletin 149, 135 p., 24 plates, map scale 1:62,500.

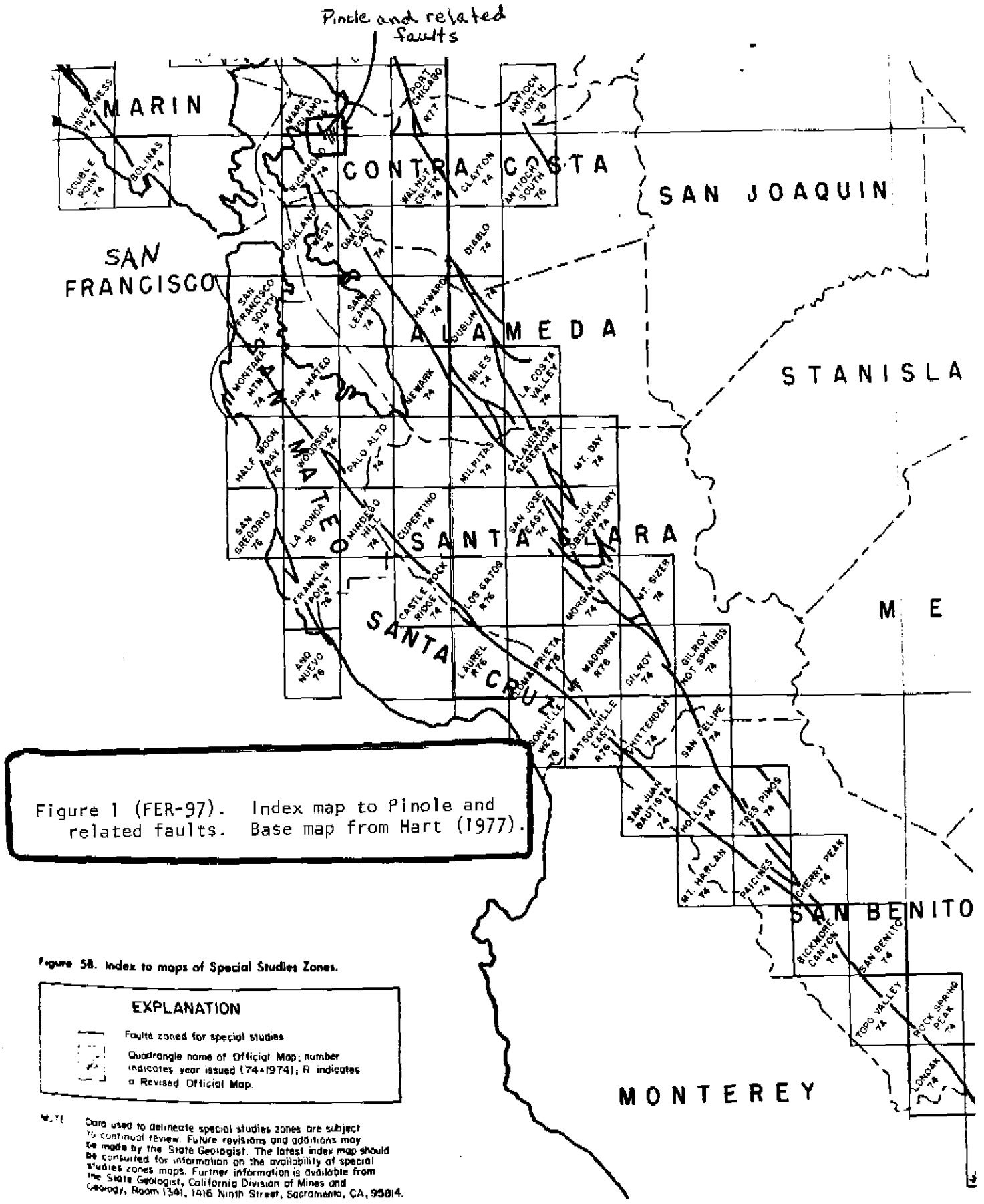

Figure 1 (FER-97). Index map to Pinole and related faults. Base map from Hart (1977).

Figure 58. Index to maps of Special Studies Zones.

EXPLANATION

Faults zoned for special studies

Quadrangle name of Official Map; number indicates year issued (74=1974); R indicates a Revised Official Map.

NOTE: Data used to delineate special studies zones are subject to continual review. Future revisions and additions may be made by the State Geologist. The latest index map should be consulted for information on the availability of special studies zones maps. Further information is available from the State Geologist, California Division of Mines and Geology, Room 1341, 1416 Ninth Street, Sacramento, CA, 95814.

Scale 1:1,000,000

1 inch equals approximately 16 miles

Zickefoose, Neil H., and Associates, 1977, Geologic fault study, six acre parcel, Belmont Way and San Pablo Avenue, Pinole: Consulting report for the City of Pinole, June 28, 26 p.

AERIAL photos:

a. National Archives and Records Services Administration, Washington Collection, Library of Congress Catalog Card No. 75-174520, Special List No. 25, 1973: USDA BUU Series (Contra Costa County, 1939); Flights 8-2-39 (frames 289-88 to 90) and 8-4-39 (frames 290-15 and 16); black and white, scale 1:24,000.

b. U.S. Geological Survey; CC series; Flight 5-18-65 (frames 15-25, 26, 31, 156, 157 and 158); black and white, scale 1:24,000.

c. U.S. Geological Survey; EF series; Flights 2-29-48 (frames 2-26 to 30, 34 to 37, and 84 to 87) and 3-1-48 (frames 2-107 to 112); black and white; scale 1:28,400.

5. Summary of available data.

The Pinole and related faults are located in the northwestern portion of Contra Costa County, just west of the town of Rodeo (figures 1 and 2). The three easternmost branches of the fault extend from the shores of San Pablo Bay, near the towns of Hercules and Pinole, southeastward to Sobrante Ridge, just south of Pinole Road (figure 2). The unnamed, westernmost branch fault, located approximately 2/3 kilometer west of Wilson Point, extends from San Pablo Bay southeastward for a distance of approximately 1.25 kilometers (figure 2).

On December 31, 1973, all four faults were proposed for zoning on the SSZ Preliminary Review Maps for the Mare Island and Richmond 7.5-minute quadrangles. The SSZ's were based on existing maps which indicated Quaternary faulting of alluvium and terrace deposits (Bishop and Knox, 1973; Sheehan, 1956; and Sims and others, 1973); map compilations did not include aerial photo interpretation or field surveys of the zones by California Division of Mines and Geology (CDMG) Alquist-Priolo staff.

During the preliminary review process, the three easternmost branches of the Pinole fault were re-evaluated and subsequently not zoned on

the 1974 SSZ Official Maps on the basis that:

a. Sheehan (1956) did not use a "concealed" symbol for his faults through Quaternary deposits, whereas updated mapping by Bishop and Knox (1973) showed the same areas as being concealed.

b. Consulting reports by Burkland and Associates (1973), and Cooper-Clark & Associates (1971, 1974) indicated that Quaternary units were not offset by faulting.

The westernmost, unnamed branch fault was retained and zoned on the 1974 Official Maps on the basis of Sims and others (1973) who showed the fault cutting Quaternary terrace deposits near the northern end of the fault.

Re-examination of the literature on the westernmost, unnamed zoned fault indicates:

a. Weaver (1949) considered the fault to be an extension of the Hayward (?) fault, with rocks of the Pliocene Orinda formation to the west downthrown from and separating the Miocene Claremont shale and the Pleistocene Montezuma formation to the east.

b. Sims and others (1973) show the fault separating Quaternary terrace deposits to the west from Quaternary terrace deposits and Miocene Claremont shale to the east.

c. The fault is not recognized at all on maps by Bishop and Knox (1973) and Sheehan (1956). These maps, instead, show a geologic contact between the Pliocene Contra Costa group to the west and Pliocene Pinole tuff and Miocene Tice shale, Oursan sandstone, and Claremont shale to the east.

d. Consulting reports by ENGEO (1978) and Zickefoose and Associates (1977) indicate that Holocene and Quaternary units along the fault south of San Pablo Avenue are not offset by faulting

(see figure 2). Zickefoose and Associates (1977, p. 8-10) attribute tonal differences and displacement of "geologically recent soil deposits" shown in their Test Trench No. 1 (Zickefoose and Associates, 1977, p. 22) to anticlinal folding and shallow landsliding.

In addition, discussions with J.D. Sims (U.S. Geological Survey, personal communication, April 3, 1980) indicated that the fault on MF-484 (Sims and others, 1973) should have been dotted (indicating that it is concealed through the Quaternary terrace deposits) rather than drafted as a solid line. According to Sims, there is no evidence that the fault cuts Quaternary units.

6. Aerial photo interpretation and field observations.

Analysis of 1939 (USDA), 1948 (USGS) and 1965 (USGS) aerial photographs and field observations are summarized on figure 2. Although bedrock units exposed south of San Pablo Avenue suggest the possibility of bedrock faulting in this area, stream terrace deposits to the south and Quaternary terrace deposits to the north do not appear to be offset. No evidence of Holocene displacement due to faulting was observed along the railroad cut at the northern end of the fault or along roads in the housing development constructed since 1965.

7. Conclusions.

A review of existing data on the unnamed, zoned branch of the Pinole fault indicates a general disagreement as to (1) the existence of the fault, and (2) the name and age of units presumably cut by the northern end of the fault. Bishop and Knox (1973) and Sheehan (1956) do not recognize the existence of the fault; Weaver (1949) considers it an extension of the Hayward fault separating Pliocene

and Miocene units; Sims and others (1973) show the fault cutting Quaternary terrace deposits, but Sims (personal communication) indicated that this was a drafting error and that the fault should have been shown as dotted (concealed) through the Qt units. Furthermore, according to Sims (personal communication) there is no evidence that the fault cuts Quaternary units. Aerial photo interpretation, field observations and consulting reports reveal no hard evidence of Holocene displacement due to faulting along the zoned fault.

8. Recommendations.

   a. Because there is no evidence of Holocene displacement due to faulting along the unnamed fault west of Wilson Point, the SSZ around this fault should be deleted.

   b. There is a need for detailed, updated mapping of geologic units and structure in the vicinity of the Pinole and related faults.

9. Report completed on April 3, 1980.

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I agree with the recommendation to delete existing SSZ. The earlier decision not to zone other traces of the Pinole fault appears justified.

Elliott
4/18/80